DOCUMENT RESUME

ED 386 869 EC 304 258

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TITLE Phonological Awareness: Curricular and Instructional Implications for Diverse Learners. Technical Report No. 22.
INSTITUTION National Center To Improve the Tools of Educators, Eugene, OR.
SPONS AGENCY Special Education Programs (ED/OSERS), Washington, DC.
PUB DATE 20 Feb 95
NOTE 24p.; For a related document, see EC 304 257.
PUB TYPE Guides - Non-Classroom Use (055) -- Information Analyses (070)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Beginning Reading; *Decoding (Reading); Educational Strategies; *Phonology; Prereading Experience; Primary Education; Reading Achievement; *Reading Difficulties; *Reading Instruction; Reading Processes; Reading Readiness; Reading Research

ABSTRACT

This review focuses on areas of converging evidence concerning the importance of phonological awareness and the corresponding curricular and instructional implications for diverse learners. Five areas of converging evidence are identified: (1) phonological processing ability explains significant differences between good and poor readers; (2) phonological awareness (a component of phonological processing) is a unitary construct with multiple dimensions; (3) phonological awareness has a reciprocal and causal relation to reading acquisition; (4) phonological awareness is a necessary but insufficient skill for early reading acquisition; and (5) phonological awareness is teachable and promoted by attention to instructional design variables. The curriculum design principles of conspicuous strategies, mediated scaffolding, strategic integration, primed background knowledge, and judicious review are then discussed in terms of application to developing phonological awareness. The review notes that similar levels of procedural details were not found for each design principle despite strong support for the underlying idea of phonological awareness. (Contains 14 references and 2 figures.) (DB)

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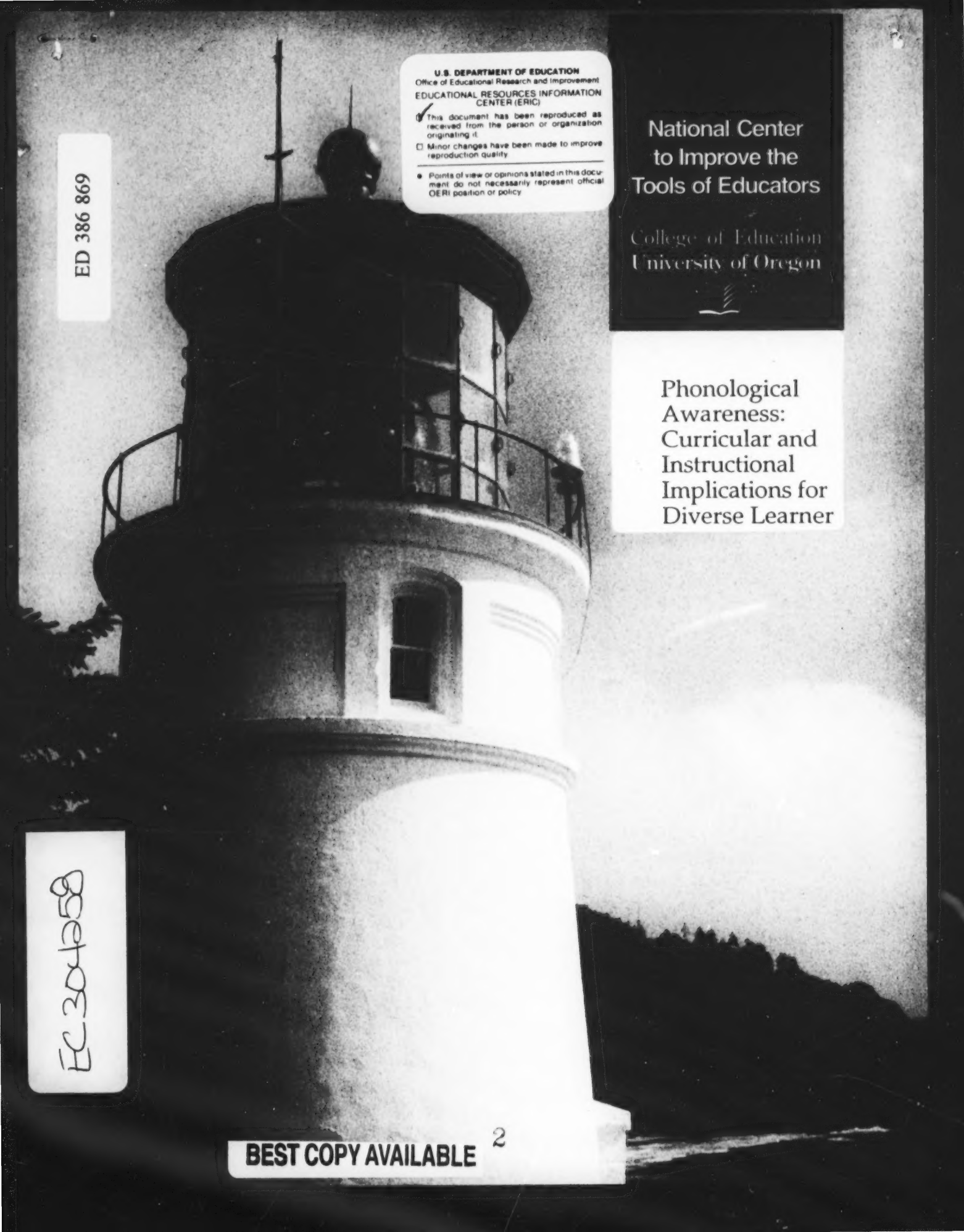

EC 304358

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Technical Report No. 22 produced for the National Center
to Improve the Tools of Educators, University of Oregon

Funded by the U.S. Office of
Special Education Programs

Phonological Awareness: Curricular and Instructional Implications for Diverse Learner

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Running Head: PHONOLOGICAL AWARENESS IMPLICATIONS

Phonological Awareness: Curricular and Instructional Implications for Diverse Learners

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Review of Converging Evidence

Research of more than two decades has affirmed the importance of phonological awareness and its relation to reading acquisition. Thus, recent reviews of the literature (Hurford, Darrow, Edwards, Howerton, Mote, Schauf, & Coffey, 1993; Mann, 1993) have indicated that the presence of phonological awareness is a hallmark of good readers while its absence is a consistent characteristic of poor readers. In considering the relation between phonological awareness and reading, we identified five areas of converging evidence in the research:

1. Phonological processing explains much of the difference between good and poor readers. (Phonological awareness is a component of phonological processing.)
2. Phonological awareness is a unitary construct with multiple dimensions.
3. Phonological awareness is causally and reciprocally related to reading acquisition.
4. Phonological awareness is a necessary but insufficient skill for early reading acquisition.
5. Phonological awareness is teachable and promoted by attending to instructionaldesign variables (e.g., conspicuous strategies to facilitate awareness, scaffolding across a continuum of difficulty for dimensions and across features of each dimension, strategic integration of phonological awareness and othernecessary components, such as letter-sound correspondence instruction).

In this review, we describe the instructional implications of these areas of converging evidence for students with diverse learning needs. We attempt to connect research and practice by responding to two focal questions: (a) What are the research-based instructional priorities or big ideas? and (b) For the instructional priority of phonological awareness, what is the existing research evidence regarding curriculum design?

Research-Based Instructional Priorities in Phonological Awareness: Big Ideas

Our research synthesis (Smith, Simmons, & Kameenui, 1995) revealed moderate support for the notion that phonological awareness is a general ability which has multiple dimensions of varying complexity. A commonly recognized definition of phonological awareness is sensitivity to the sound structure of language and a conscious ability to detect, combine, and manipulate different sizes of sound units. Although research has not definitely concluded which dimensions are obligatory for beginning reading, the converging evidence suggests the preeminent lasting effects of a delay in phonological awareness. Thus, the research convergence points to a priority of early identification of students with low phonological awareness.

Further underscoring the research convergence, none of the primary or secondary sources reviewed in the research synthesis (Smith et al., 1995) disputed the hypothesis that phonological awareness plays a central role in reading acquisition. Since phonological awareness has been established as one of the prerequisites for reading acquisition, phonological awareness instruction, therefore, is obligatory, not optional. In this respect, the training studies reviewed in the research synthesis (Smith et al., 1995) converged to provide strong support for the importance of phonological awareness instruction prior to reading instruction across abilities. Moreover, for diverse learners, strong effects of phonological awareness training on subsequent reading and spelling achievement underscored the critical importance of early identification and intervention for phonological awareness development.

In the following section, we discuss the big idea of phonological awareness in relation to a framework of curriculum design principles. Specifically, we use the principles of conspicuous strategies, mediated scaffolding, strategic integration, primed background knowledge, and judicious review to render the implications

more explicit and employable. When applied to phonological awareness, these procedural principles illustrate how to translate research into practice.

In our review, we did not find similar level of procedural details for each design principle despite strong support for the underlying big idea of phonological awareness. For example, research indicated many procedural details for scaffolding, but few for judicious review. The following section should not be viewed as a prescription, but rather as an application of principles that can be used to make tangible the details of instruction required for students with diverse learning needs.

Evidence of Curriculum Design in Phonological Awareness

In this section, we focus on five curriculum design principles: (a) conspicuous strategies, (b) mediated scaffolding, (c) strategic integration, (d) primed background knowledge, and (e) judicious review, while addressing the question: For the instructional priorities of phonological awareness, what is the existing research evidence regarding curriculum design?

Conspicuous Strategies

Conspicuous strategies are sequences of teaching events and teacher actions that make explicit the steps required to hear and manipulate sounds (Dixon, Carnine, & Kameenui, 1992). Research findings recommend that phonological awareness instruction be explicit, not left to either natural development in the absence of instruction or inference by the learner during instruction. A characteristic feature of explicit instruction is the use of conspicuous strategies that offer a plan of action, in this context, for learning new phonological awareness skills. Phonological awareness strategies need to be obvious and salient to the learner for two reasons.

First, phonemes are not easy to isolate because we seldom hear pure phonemes. Rather, phonemes are coarticulated (i.e., merged and not pronounced as discrete sounds) and subject to distortion (addition of vowels; e.g., /duh/ instead of /d/) when produced orally (Ball & Blachman, 1991; Spector, 1995). Therefore, researchers

suggest that detection of phonemes requires an artificial analysis rather than discrimination of a naturally perceived acoustical unit (Ball & Blachman, 1991). Similarly, developmental work in phonological awareness suggests that detection of phonemes is neither natural nor acquired in the absence of instruction for many children (Liberman & Shankweiler, 1985).

Second, in normal speech development, infants articulate single phonemes and small groups of phonemes (e.g., eee, eee, eee; ba, ba, ba). Over time, children learn to pay attention to meaning, not individual sounds. In contrast, reading acquisition involves moving from translating letters to sounds and combing those sounds to form words that, in turn, lead to word meanings in the child's listening vocabulary. In short, acoustical properties and hierarchical development in language obscure perception of individual phonemes. Thus, conspicuous strategies are necessary to make phonemes prominent in children's attention and perception.

Features of conspicuous strategies common across studies in which students consistently achieved positive and durable improvement in phonological awareness, reading, and spelling included direct teaching of phonological detection and manipulation, which involves: (a) teacher modeling of specific sounds, and (b) student producing specific sounds.

Direct teaching of phonological detection and manipulation may include using concrete representation of sounds to make the mental manipulations of phonemes overt for the learner and teacher. (See Figure 1 for an illustration of a template used with concrete representations; e.g., blank tiles). Concrete representation involves using a neutral object to stand for a sound. For example, in a segmentation strategy, students hear the teacher model a sound, then say the phoneme while simultaneously moving a blank tile that represents the phoneme (Ball & Blachman, 1991; O'Connor, Jenkins, & Slocum, 1993. In contrast, a strategy for detecting phonemes that does not include concrete representation might ask students to pull

the first sound away from the rest of the word in their mind and then say the sound pulled away.

Insert Figure 1 about here

Letter-sound correspondences are a type of concrete representation of sound. That is, letters represent sounds via visual symbols. Several studies incorporated letter-sound correspondence and phonological awareness activities. Findings suggested that this combination facilitated students' understanding of the relation between sounds and written symbols. Research has not established the optimal sequence of instruction for all learners. For example, it is unclear whether all learners would benefit more from auditory instruction (i.e., phonological awareness without letter-sound correspondences) followed by the addition of letter-sound correspondence, or from simply beginning instruction by combining the teaching of letter-sound correspondence and phonological awareness.

The following sequence summarizes a typical research-based strategy for teaching segmenting: (a) teacher models segmentation (word meaning often prompted with a picture), (b) children touch or move a concrete representation of a sound and vocally produce segmented phonemes, (c) children repeat the word. In addition, after letter-sound correspondences are learned, letter tiles are used as concrete representations.

Mediated Scaffolding

Mediated scaffolding is external support provided by the teacher, tasks, and materials during initial learning of sounds and strategies for consciously hearing and manipulating sounds. The amount and type of mediated scaffolding used is determined by the needs of individual students in relation to the task. Therefore,

scaffolding is variable, determined by the interaction between the materials and the learners. Such variation refers not only to the teacher support provided during initial learning, but also the gradual reduction of support as children become more fluent in phonological awareness skills. As illustrated below, the support can take the form of task adjustment, materials variations, or teacher support.

Task adjustment. Phonological awareness tasks can be adjusted by focusing on factors that contribute to difficulty. This is done by attending to a continuum of difficulty for each factor. In phonological awareness, these factors include (a) number of phonemes in a word (e.g., cat is easier than sand); (b) size of a phonological unit (e.g., compound words are larger than phonemes); (c) phoneme position in words (e.g., initial sounds are easiest and medial sounds are most difficult); (d) phonological properties of words (e.g., continuants, such as /m/, are easier than stop sounds, such as /t/); and (e) phonological awareness dimension (e.g., rhyme is easier than segmentation) (see Figure 1).

While our research synthesis (Smith et al., 1995) indicated that a common characteristic of effective phonological interventions was attention to a continuum of difficulty for each of the features, of the five factors, the phonological properties of words have received the most significant empirical attention. For example, across studies continuant sounds were typically introduced before stop sounds, because stop sounds are more difficult to elongate and, therefore, more difficult to isolate, detect, and manipulate. Stop sounds were often introduced later because of the articulatory distortion that often occurs when a stop sound is produced in isolation. For example, it is difficult for many children to detach the vowel sound /u/ when voicing the /t/. Similarly, consonant clusters often are more difficult than continuants (e.g., /f/ in fish can become /ffffish/ in contrast to /st/ in star which is impossible to elongate and difficult to analyze because /t/ is a stop sound).

The importance of attending to factors and their continua of difficulty supports the theory that perception and coding of linguistic material explains many differences in children's ease of reading acquisition. Moreover, attention to the relative difficulty of factors aligns with empirical evidence. Thus, research consistently documents that the problematic aspect of language for many children is the phonological component. When instruction is scaffolded (e.g., graduating difficulty of task), the problematic aspect of reading (i.e., phonological features of language) is mediated and systematically lessened. Empirical evidence strongly indicates that scaffolding phonological complexity meets the needs of all learners and the specific needs of diverse learners.

Figure 2 presents an overview of phonological dimensions and the continuum of difficulty for each. However, Figure 2 does not show the complex interrelations that can occur among the dimensions. For example, a short word (few phonemes), trip, which contains an initial consonant cluster, /tr,/ (difficult phonologically because initial sound cannot be elongated--the /r/ is difficult for some young children to pronounce, and clusters are more difficult than single phonemes) can be used for segmenting, which is a more difficult task. In beginning instruction, the teacher should present the simplest features of instructional examples to ensure that diverse learners are successful initially with beginning reading tasks.

Insert Figure 2 about here

Materials scaffolding. Materials used in phonological awareness activities include puppets, stories, pictures, blank tiles or markers, alphabet letter tiles, and template cards with boxes for the sounds in words. Studies with young children frequently employed puppets who spoke in "broken up" ways (segmentation) to illustrate strategies. In addition, materials, such as concrete representations and

picture cue cards, are used to help focus children's attention. An example of a high degree of material scaffolding is the number of markers and squares in a template to equal the number of phonemes in a word to be segmented (see Figure 3).

Use of the template in research typically progressed according to the following sequence (e.g., Ball & Blachman, 1991; O'Connor et al., 1993). First, children moved blank tiles to a square for each sound during segmentation activities. After the children had mastered some letter-sound correspondences, one of the blank tiles was replaced by a letter tile. Typically, when letter tiles were introduced, the letter tile would represent the initial phoneme because it was the easiest. In addition, only one letter tile would be used initially to lessen the difficulty of the task.

Teacher scaffolding. Multiple studies included scaffolds in which teachers (a) modeled phoneme sound production; (b) explicitly drew attention to how the sound *feels* when it is produced (Lie, 1991); (c) modeled strategies for detecting, saying, and moving phonemes; and (d) verbally stressed the target phoneme. An example of a low degree of teacher scaffolding involves prompting during application and practice of recently learned skills.

The following research-based sequence summarizes mediated scaffolding (Ball & Blachman, 1991; Bryne & Fielding-Barnsley, 1989; Cunningham, 1990; Lie, 1991; O'Connor et al., 1993):

1. The teacher models the sound/strategy.
2. Children use the strategy to produce the sound.
3. Steps 1 and 2 are repeated across multiple examples for each dimension and level of difficulty across phonological dimensions.
4. Children are prompted to use the strategy during guided practice.
5. More difficult examples across continua of difficulty for each dimension and for each feature of each dimension are introduced and steps 1-5 are followed.

Strategic Integration

Strategic integration refers to the planful consideration and sequencing of phonologic and alphabetic tasks to promote reading acquisition. It occurs when previously learned phonological skills are integrated with new skills, such as letter-sound correspondences. Though phonological awareness plays a causal role in reading acquisition, our review of the research indicated that phonological awareness is necessary but insufficient for successful reading acquisition. Alphabetic understanding is also a prerequisite to learning to read new words independently. Consequently, strategic integration of letter-sound correspondence instruction with phonological awareness is necessary in beginning reading instruction. Such a combination helps children acquire alphabetic understanding and improves their phonological awareness better than phonological awareness instruction alone. In addition, researchers have found that the effectiveness of phonological awareness/letter-sound correspondence instruction is strengthened by integrating direct instruction in reading (Cunningham, 1990; Snowling, 1991).

The following sequence, derived from the research, characterizes the strategic integration of phonological awareness, alphabetic understanding and reading instruction (Ball &1990; O'Connor et al., 1993): Blachman, 1991; Bryne & Fielding-Barnsley, 1989; Cunningham,

1. Begin with phonological awareness activities (e.g., teach detection and segmenting).
2. Use simple phonological units (e.g., 1-2 phonemes, continuants) and focus on initial sounds.
3. After student mastery of simple phonological awareness skills, introduce letter-sound correspondences for phonemes used in phonological awareness activities.
4. Increase the complexity of phonological units over time (e.g., 3-4 phonemes, stopsounds, final and medial sounds).

5. Apply knowledge and strategies gained in steps 1-4 to decode words. When students know sufficient numbers of letter-sound correspondences, begin reading nstruction (i.e., blending and segmenting) concurrently with phonological awareness instruction. Design instruction by attending to interactions among continua of difficulty for each dimension and for each characteristic of each dimension. Continue with additional letter-sound correspondences.

Primed Background Knowledge

Primed background knowledge includes relevant and essential language skills and strategies with sounds that optimize new learning of phonological awareness. An analysis of the previous integration sequence suggests that progress in the sequence depends upon facile retrieval and application of previously learned phonological awareness skills and letter-sound correspondences. For diverse learners, acquiring such facility may require that the teacher primes background knowledge, including letter-sound correspondences and dimensions of phonological awareness. For example, the ability to detect individual phonemes is relevant to segmenting. Therefore, a system for activating and linking previously learned skills to advanced application (e.g., from detection to segmentation) is critical for diverse learners.

Priming background knowledge was not an obvious or common feature of the training studies reviewed in the research synthesis (Smith et al., 1995), because of a relatively narrow focus and length of time for most of these studies. In a yearlong phonological awareness intervention however, Lundberg, Frost, and Petersen, (1988) noted that the progression through the tasks was designed to be slow to ensure mastery, even for children who were low in phonological awareness ability. Nevertheless, Lundberg et al., (1988) did not report any methods used to prime

background knowledge as students moved through the yearlong sequence of phonological skills acquisition.

Judicious Review

Judicious review refers to the sequence and schedule of opportunities provided children to apply and develop facility with sounds. Although much of the phonological awareness research did not systematically investigate judicious review for diverse learners, the importance of such review is implied. For example, the systematic progression from easy to more difficult features across the continua of phonological difficulty, which characterized all training studies, implied practice and review (see Figure 2). Two types of review found in phonological awareness instruction research are guided practice and daily review (Cunningham, 1990).

Guided practice is a type of scaffolding that includes varying amounts of assistance. For example, students may be told when to use a specific strategy that had been previously taught, followed by the teacher modeling the strategy, and concluding with students using the strategy with immediate teacher feedback. This amount of assistance in the same lesson could be reduced to a verbal prompt of the strategy (e.g., the metacognitive strategy to "cut up" unfamiliar words in their minds (Cunningham, 1990).

Daily review links previous to current lessons, thereby helping to prime background knowledge and skills. Thus, a carefully planned system of review interwoven with the presentation of new material enhances the development of automaticity, or fluency, that enables short-term memory to process increasing amounts of information. To get beyond the starting point in reading acquisition, attention to the design principle of judicious review is pivotal.

Conclusion

The purpose of this discussion was to relate research and practice by responding to two focal questions: (a) What are the research-based instructional priorities, or big

ideas? and (b) For the instructional priority of phonological awareness, what is the existing research evidence regarding curriculum design?

An overwhelming convergence of multiple lines of research has firmly established the importance of phonological awareness in reading acquisition. The existence of both causal and reciprocal relations between phonological awareness and reading acquisition fixes phonological awareness as an instructional priority. Moreover, research indicates that deficits in processing the phonological features of language explain a significant proportion of beginning reading problems and correlated difficulties in reading comprehension, background knowledge, memory, and vocabulary differences. Thus, for diverse learners, early identification of phonological awareness deficits combined with early intervention is pivotal in ensuring success in learning to read.

From the research, we concluded that the use of the design principles (i.e., conspicuous strategies, mediated scaffolding, strategic integration, primed background knowledge, and judicious review) facilitates perception of, quality of representation and, therefore, retrieval of phonologically coded material. This conclusion is particularly significant for beginning readers, especially diverse learners, who have difficulty becoming aware of the abstract, phonological features of words to which we do not consciously attend (Adams, 1990).

In our review, we did not find similar levels of procedural details for each design principle, despite strong support for the underlying big idea of phonological awareness. For example, more procedural details were found for conspicuous strategies, scaffolding, and strategic integration than for primed background knowledge and judicious review. The purpose of conspicuous strategy instruction is to make explicit the phonological dimensions, particularly phonemes, to which we do not typically attend (Adams, 1990). Moreover, mastery of one strategy does not guarantee mastery of a subsequent strategy without instruction. Results from the

research suggested that the curriculum design principle, scaffolding, makes a significant difference in learner outcomes, particularly for diverse learners. It follows then that, if all materials and tasks are scaffolded, all strategies necessary for reading acquisition are strategically integrated and, given sufficient judicious review, diverse learners would learn to read with greater likelihood of success.

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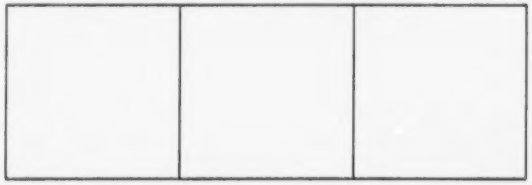
Figure Captions

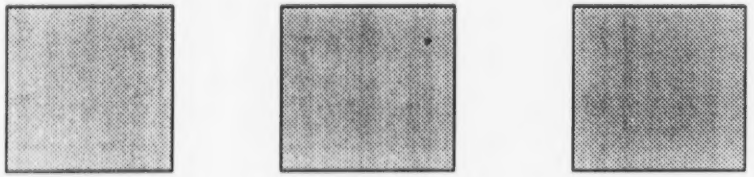
Figure 1. Template for concrete representation instruction. Example for 3-phoneme word.

Figure 2. Dimensions that contribute to phonological difficulty.

Figure 1. Template for concrete representation instruction. Example for 3-phoneme word.

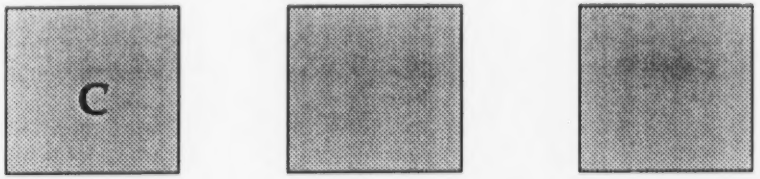


3 blank tiles for each square in template (example of degree of high scaffolding)



(O'Connor et al., 1993)

Tiles with letters added after sound-symbol relations instruction (example of scaffolding more difficult task, i.e., using sound-symbol relations).



(Ball & Blachman, 1991)

Figure 2. Dimensions that contribute to phonological difficulty.

Dimension	Simple	Example	Difficult	Example
Word Length	1-3 phonemes. Length reduces memory load.	At, sat	More than 3. Length increases memory load.	Class, swing, pumpkin
Size of Phonological Unit	Compound words syllables, onset-rimes	Carwash kitt-y am, Sam, pan	Phonemes	Individual sounds of letters (e.g., /m/)
Position of Phonemes in Words	Initial, then last	First and last sound in sit, kit, mit	Medial	Identify medial phoneme in "school".
Phonological Properties of Phonemes and Clusters in Words	Continuants (sounds that can be extended)	Say, "mmmmman."	Consonant clusters, later-developing phonemes	What sounds does the beginning of "school" say? /r/, /l/